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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SØREN KNUDSEN, GUSTAV HAMBRAEUS, LENE MOLSKOV BECH, STEEN BECH SØRENSEN, BIRGITTE SKADHAUGE, KLAUS BREDDAM, and OLE OLSEN

Appeal 2016-007956
Application 13/132,765[1]
Technology Center 1600

Before DEMETRA J. MILLS, ELIZABETH A. LAVIER, and DEVON ZASTROW NEWMAN, *Administrative Patent Judges*.

LAVIER, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellants seek review of the Examiner's rejection of claims 1, 2, 4, 5, 7, 12, 13, 19, 26, 27, 30, 34, 42, 43, 51–53, and 55–59. We have jurisdiction under 35 U.S.C. § 6(b). For the reasons set forth below, we REVERSE.

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[1] Appellants state the real parties in interest are Carlsberg Breweries A/S of Kobenhavn V, Denmark, and Heineken Supply Chain B.V. of Amsterdam, Netherlands.

BACKGROUND

The Specification describes barley and barley-derived beverages with "notably reduced levels of both dimethyl sulfide (DMS) and/or its precursor S-methyl-L-methionine (SMM), or lacking one or preferably both of said compounds," and methods relating thereto. Spec. 1:9–11. The Specification explains that "the methionine (Met)-S-methyltransferase (MMT) enzyme catalyzes the transfer of a methyl group from S-adenosyl-methionine (AdoMet) to Met, forming SMM." *Id.* at 2:7–8.

Claim 12 is illustrative:

> 12. A barley plant, or part thereof, wherein the barley plant carries a mutation in the gene encoding methionine-S-methyltransferase (MMT) that causes a total loss of MMT function.

Appeal Br. 20 (Claims Appendix).

REJECTION MAINTAINED ON APPEAL

Claims 1, 2, 4, 5, 7, 12, 13, 19, 26, 27, 30, 34, 42, 43, 51–53, and 55–59 stand rejected under 35 U.S.C. § 103(a) as unpatentable over McElroy,[2] Kocsis,[3] Bisgaard-Frantzen,[4] Douma,[5] and Pimenta.[6] Ans. 2.

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[2] McElroy & Jacobsen, *What's Brewing in Barley Biotechnology?*, 13 BIOTECHNOLOGY 245 (1995).
[3] Kocsis et al., *Insertional Inactivation of the Methionine S-Methyltransferase Gene Eliminates the S-Methylmethionine Cycle and Increases the Methylation Ratio*, 131 PLANT PHYSIOLOGY 1808 (2003).
[4] Bisgaard-Frantzen et al., US 2006/0057684 A1, published Mar. 16, 2006.
[5] Douma et al., US 6,660,915 B2, issued Dec. 9, 2003.
[6] Pimenta et al., *S-Adenosyl-L-Methionine:L-Methionine S-Methyltransferase from Germinating Barley*, 118 PLANT PHYSIOLOGY 431 (1998).

DISCUSSION

Appellants argue, *inter alia*, that the prior art provided no motivation to make a total loss of function MMT mutant in barley because prior art production methods of reducing DMS concentration in beer (such as those described in Bisgaard-Frantzen) were sufficient to achieve DMS levels below the reported sensory threshold for DMS, i.e., about 25–50 ppb, to avoid the undesirable sulfury flavor associated with DMS. *See* Appeal Br. 14 (discussing Bisgaard-Frantzen 10, Table 7; Spec. 2:1–2 (citing Meilgaard[7])), 18 (discussing Spec. Examples 1, 7; Bech Decl.[8] ¶¶ 5–6). In contrast, the null-MMT malt described in the Specification generated beers with 4 ppb DMS. Spec. 57:6–9 (Example 7). Appellants also rely on Dr. Bech's Declaration, and related disclosures in the Specification, to show that Appellants discovered, unexpectedly, that even at levels below the known, reported sensory threshold, DMS can mask a desirable estery flavor in beer. *See* Appeal Br. 18 (discussing Spec. Examples 1, 7; Bech Decl. ¶¶ 5–6); *see also* Bech Decl. ¶ 7. Thus, according to Appellants:

> reduction of DMS levels to below 20 pp[b], as recited for the beverages of claim 1, may have a[positive] impact on flavor that was not realized prior to the invention, namely, an increase in estery score. As such beverages are prepared from the plants of claim 12, this unexpected result applies to all of the rejected claims.

Id.

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[7] Meilgaard, *Prediction of Flavor Differences between Beers from Their Chemical Composition*, 30 J. AGRIC. FOOD CHEM. 1009 (1982).
[8] Declaration of Lene Bech, PhD (March 6, 2015).

The Examiner's findings include a general discussion of a desire in the prior art to "reduce DMS levels" to yield "a reduction in the off-flavors of beer," and that the ordinarily skilled artisan "would expect even lower levels of DMS to be achieved" by combining the references as claimed. Non-Final Action 7; *see also* Ans. 10 (finding "the prior art acknowledges that DMS levels lead to off-flavor in beer"). Further, the Examiner maintains that "the claimed DMS levels necessarily arise from making a barley that carries a mutation causing a total loss of function of MMT function." Ans. 16; *see also id.* at 11.

We find that Appellants have the better position. The Examiner does not cite evidence or explain why a general motivation in the prior art to reduce DMS levels in beer would extend beyond the reported sensory threshold for DMS, i.e., beneath 25–50 ppb. Or, as Appellants put it, "one would not have expected any further improvement in flavor" (Reply Br. 11) from further reductions of DMS levels beyond the threshold. The motivation for combining the references articulated by the Examiner is, as far as we can discern, based solely on a desire to reduce off-flavors imparted by DMS. *See* Non-Final Action 7; Ans. 10. Because the prior art taught that DMS could not be tasted at levels beneath 25–50 ppb, and the prior art already taught methods for achieving DMS levels around this threshold, some evidence in the prior art and/or analysis to support a motivation for further reduction in DMS to levels below 20 ppb provided by the Examiner was needed to reject the claims. *Cf. KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) ("[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does."). This is especially

the case in view of the evidence of unexpected results in the Specification (Spec. 51 and Examples) (as supported by the Bech Declaration ¶¶ 7, 8), which we also find persuasive on this record, of the role of low levels of DMS below 20 ppb in unexpectedly masking desirable estery flavors in a beverage from a barley plant.

CONCLUSION

The rejection of claims 1, 2, 4, 5, 7, 12, 13, 19, 26, 27, 30, 34, 42, 43, 51–53, and 55–59 is reversed.

REVERSED